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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional)

HSJ9-2003-0258US1

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Michael J. Halbert

Application Number

10/779,356

Filed

February 12, 2004

First Named Inventor

James M. Freitag

Art Unit

2627

Examiner

Mark S. Blouin

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐

applicant/inventor.

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assignee of record of the entire interest.

See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)☒

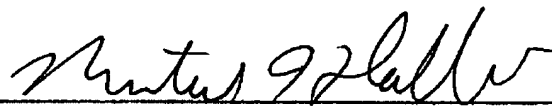
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NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☒

*Total of 6 forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any

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ARGUMENTS FOR REQUESTING PRE-APPEAL BRIEF REVIEW

Claims 1-25 currently stand rejected, with Claims 1, 5-12, and 16-23 rejected as anticipated by Katti et al. (6,707,084) ("Katti"), Claims 2, 13, and 24 rejected as obvious over Katti; and Claims 3, 4, 14, 15, and 25 rejected as obvious over Katti in view of Schwarz et al. (6,897,532) ("Schwarz"). Applicant submits that Katti does not include at least one limitation in the claims and that Schwarz fails to make up for the deficiency.

INDEPENDENT CLAIM 1

One aspect of the claimed invention is the use of a separate refractory metal layer and silicon layer in the capping layer structure of a spin valve sensor. By depositing the refractory metal and silicon as two separate layers, the silicon will act as a diffusion species to produce a silicide at the boundary of the two layers thereby producing a large compressive stress in the capping layer structure. Independent Claim 1 recites this structure as "a capping layer structure including a refractory metal layer and a silicon layer".

The Examiner's final rejection of November 14, 2006, states that Katti shows "a capping layer (416,418) including a refractory metal (tantalum – Col. 6, line 60) layer and a silicon layer (CrSi – Col. 7, line 3)...." The Examiner is taking the position that the CrSi layer includes silicon and is therefore a silicon layer. See, Response to Arguments. Notably, the Examiner is also takes an inconsistent position that the CrSi layer is a silicide layer in the rejection of Claims 11 and 21, discussed below.

Applicant submits that the claimed "silicon layer" is not the same structure as the chromium silicon (CrSi) layer disclosed in Katti. The chromium silicon (CrSi) layer disclosed in Katti is structurally different than what is claimed in a significant manner. The claimed structure of "a capping layer structure including a refractory metal layer and a silicon layer" results in a large compressive stress as the silicon in the silicon layer acts as an active diffusion species to produce a silicide. See, paragraph 26 of the present application.

The use of a combination of chromium silicon (CrSi) as disclosed in Katti, however, results in the silicon being bonded to the chromium, and is, therefore, not available to act as an active diffusion species with the refractory metal. Thus, Katti discloses a structurally different device than is recited in Claim 1.

It is noteworthy that Katti also discloses the use of "copper (Cu), tantalum (Ta), titanium nitride (TiN), and the like" in place of the CrSi layer 418. See, col. 7, lines 3-6.

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Thus, according to Katti, the use of CrSi in layer 418 is interchangeable with metals/metal alloys such as Cu, Ta and TiN, as opposed to being interchangeable with silicon, further supporting Applicant's position that the disclosed CrSi layer is structurally different than the silicon layer recited in Claim 1.

Accordingly, the capping structure with a CrSi layer that is disclosed in Katti is significantly different than the capping structure recited in Claim 1, and, thus, Katti does not anticipate Claim 1. Moreover, it would not be obvious to modify Katti to remove the Chromium from the CrSi layer as Katti treats the CrSi in layer 418 is interchangeable with metals/metal alloys Cu, Ta and TiN, as opposed to being interchangeable with silicon. Claims 5-10 depend from Claim 1 and are, therefore, likewise patentable for at least the same reasons.

INDEPENDENT CLAIMS 11 and 21

Independent Claim 11 recites a spin valve sensor with "a capping layer structure comprising a first capping layer and a second capping layer ... the first capping layer interfacing with the second capping layer to form a silicide that provides a compressive stress on the pinned layer structure." Independent Claim 21 recites "forming a capping layer structure" comprising "forming a first capping layer of a refractory metal" and "forming a second capping layer of silicon on the first capping layer ... wherein a silicide is formed at the junction of the first capping layer and the second capping layer."

The Examiner cited Katti as discussed above and stated that "the first capping layer interfacing with the second capping layer to form a silicide that provides a compressive stress on the pinned layer structure (inherent)." In the Response to Arguments, the Examiner takes the position that the CrSi layer is a silicide. Applicant notes the inconsistency of the Examiner's positions, i.e., in the rejection the Examiner states that it is the interfacing between the first capping layer (the refractory metal) with the second capping layer (the CrSi layer) that forms the silicide, but in the Response to Arguments, the Examiner states that it is the CrSi that is the silicide. Applicant submits that neither is correct.

Applicant notes that Claim 11 requires that it is "the first capping layer interfacing with the second capping layer to form a silicide" and Claim 21 similarly requires that the "silicide is formed at the junction of the first capping layer and the second capping layer". Thus, to the extent that the Examiner's rejection is based on the the CrSi layer being a silicide,

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as stated in the Response to Arguments, Applicant submits that Katti does not disclose all the elements of Claims 11 or 21.

To the extent that the Examiner's rejection is based on the interfacing between the first capping layer (the refractory metal) with the second capping layer (the CrSi layer) in Katti to form the silicide, Applicant respectfully disagrees. As discussed above, the silicon in the chromium silicon (CrSi) combination is bonded to the chromium and generally will not be available to act as an active diffusion species to form "a silicide that provides a compressive stress on the pinned layer structure." Thus, Katti does not disclose explicitly or inherently "the first capping layer interfacing with the second capping layer to form a silicide that provides a compressive stress on the pinned layer structure" as recited in Claim 11 or "a silicide is formed at the junction of the first capping layer and the second capping layer" as recited in Claim 21.

Accordingly, Applicant respectfully submits that Claims 11 and 21 are patentable over Katti. Claims 12, 16-20 depend from Claim 11 and Claims 22 and 23 depend from Claim 21 and are, therefore, likewise patentable for at least the same reasons as Claims 11 and 21.

DEPENDENT 2-4, 13-15 AND 24-25

Claims 2, 13, and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Katti. Claims 2, 13, and 24 depend from Claims 1, 11, and 21, respectively, and are, therefore, likewise patentable for at least the same reasons.

Claims 3, 4, 14, 15, and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Katti in view of Schwarz. Schwarz, however, fails to make up for the deficiencies of Katti. Accordingly, Claims 3-4, 14-15, and 25, which depend from Claims 1, 11, and 21, respectively, are, likewise patentable for at least the same reasons.

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